

REMARKS

Entry of the foregoing, re-examination and reconsideration of the subject matter identified in caption, as amended, pursuant to and consistent with 37 C.F.R. §1.111, and in light of the remarks which follow, are respectfully requested.

Claim 65 has been amended to delete “a group R,” “a group –NHR_a” and “a group –N(R_a)₂” from the definition of X₁ and X₂. Claims 67 and 68 have been rewritten as amended claims 67 and 68, and new claims 94 and 95. In addition, claims 65, 68 and 74 have been amended to further improve their form and/or clarity. Claims 1-64 were previously canceled. Upon entry of the Amendment, claims 65-95 will be all the claims pending in the application.

I. Response to Rejection under 35 U.S.C. § 112, Second Paragraph

Claim 65 was rejected under 35 U.S.C. § 112, second paragraph, for the reasons set forth at page 3 of the Office Action.

Applicants respectfully submit that claim 65 as amended is not indefinite. As noted above, claim 65 has amended to delete the phrase “group R.” Accordingly, the Examiner is respectfully requested to reconsider and withdraw the rejection.

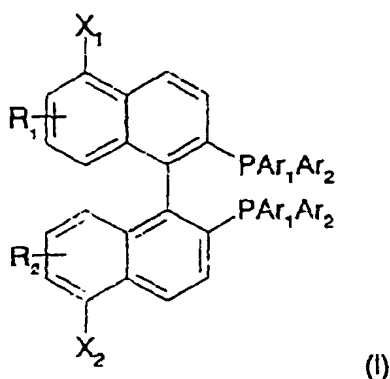
II. Response to Rejection under 35 U.S.C. § 103(a)

Claims 65-68 were rejected under § 103(a) as being obvious over Lamouille et al., “Hydrogenation of ethyl acetoacetate catalyzed by hydrosoluble BINAP derivatives,” Tetrahedron Letters (2001), 42(4), 663-664, Ter Hallea et al., “Synthesis and evaluation of poly-NAP-Ru, an heterogeneous enantioselective catalyst,” Comptes Rendus de l’Academie

des Sciences, Serie IIc: Chimie (2000), 3(7), 553-56, or WO 2000049028 (also U.S. Patent No. 6,610,875) to Lemaire et al.

Applicants respectfully submit that the present claims are patentable over the cited references for at least the following reasons.

Present claims 65-68 are directed to a new diphosphine represented by the following formula (I):



in said formula:

- R_1 and R_2 , which are identical or different, represent a hydrogen atom or a substituent,
- Ar_1 and Ar_2 independently represent an alkyl, alkenyl, cycloalkyl, aryl or arylalkyl group,
- X_1 and X_2 , which are identical or different, represent:
 - an alkyl, alkenyl, alkynyl, cycloalkyl, aryl or arylalkyl group,
 - an alkyl group substituted with one or more halogen atoms, or with nitro or amino groups,
 - a halogen atom selected from the group consisting of bromine, chlorine and iodine,
 - an -OH group,
 - a group -O-COR_a,

a group $-O-R_a$,

a group $-S-R_a$,

a $-CN$ group,

a group selected from the group consisting of:

a $-CH_2-NH_2$ group, and

a $-COOH$ group,

a group selected from the group consisting of:

a group $-COOR_a$,

a $-CH_2OH$ group, and

a group $-CO-NH-R_b$,

a group selected from the group consisting of:

a group $-CH_2-NH-CO-R_b$,

a group $-CH_2-NH-CO-NH-R_b$,

a group $-CH_2-N=CH-R_a$,

a $-CH_2-N=C=O$ group, and

a $-CH_2-NH_4^+$ group,

a group selected from the group consisting of:

a group $-N=CH-R_a$,

an $-NH-NH_2$ group,

an $-N=N^+=N^-$ group, and

an $-N=C=O$ group,

a magnesium or lithium atom,

in the various formulae, R_a represents an alkyl, cycloalkyl, arylalkyl or phenyl group and R_b has the meaning given for R_a and also represents a naphthyl group.

Applicants advise that it is difficult to introduce functional groups in the 5 and 5' positions of a binaphthyl molecule and that the presently claimed diphosphine cannot be obtained according to the processes known in the art.

This diphosphine can be used as a ligand in metallic complexes which can be used in asymmetric reaction, particularly, asymmetric hydrogenation. In this regard, Examples 5, 10 and 11 of the present specification show unexpectedly superior enantioselectivity results (ee = 99%) obtained by employing the ligands 5,5'-diamBINAP and 5,5'-diperfluorohexylBINAP in a reaction of hydrogenation.

On the other hand, Lamouille et al., Ter Hallea et al. and WO '028 merely describe the compounds wherein the functional groups are in positions 6 and 6' of the naphthyl groups, which are different from the presently claimed diphosphines. Further, none of Lamouille et al., Ter Hallea et al. and WO '028 describe or suggest the presently claimed diphosphines or the unexpected results which can be achieved therefrom. Moreover, Applicants advise that in the field of the asymmetrical catalysis, it is not possible to envisage the results obtained, in particular, on the enantioselectivity of a particular reaction.

In view of the foregoing, Applicants respectfully submit that the present claims are not obvious over the cited references and thus the rejection should be withdrawn.

III. Response to Claim Objection

Claim 74 was objected to as being dependent upon a rejected base claim.

Applicants respectfully submit that the rejection of claim 65, from which claim 74 depends, has been overcome as set forth above, and thus the objection should be withdrawn.

IV. New Claims

Applicants respectfully submit that new claims 94 and 95 are novel and unobvious over the cited references for at least the same reasons set forth above in section II.

V. Conclusion

From the foregoing, further and favorable action in the form of a Notice of Allowance is believed to be next in order and such action is earnestly solicited. If there are any questions concerning this paper or the application in general, the Examiner is invited to telephone the undersigned at (202) 452-7932 at his earliest convenience.

Respectfully submitted,

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By: _____



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